

d. Remarks

The Office Action rejects independent claims 1 and 15 as obvious over U.S. Patent 5,321,501 (Swanson '501) and U.S. patent 5,956,355 (Swanson '355).

A. At page 3, the Office Action admits that Swanson '501 does not teach measuring a speed of the sample as in claims 1 and 15. Furthermore, the Office Action states that:

Swanson '355 teaches ... imaging a sample ... utilizing acousto-optic modulation (for example, see element 320 in Figure 6) including measuring relative motion of a sample ... (see bottom of column 13-column 14) by use of Doppler shifting algorithms.

With further regard to claims 1 and 15, Swanson '355 teaches the advantages of acousto-optic modulation frequency shifting (see column 12). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Doppler shifting technique and apparatus of Swanson '355 with the ... technique of Swanson '501 in order to accurately determine the speed of samples of interest.

Office Action, pages 3 – 4.

Thus, the Office Action relies on Swanson '355 and, more specifically, on the disclosure of the function of element 320 in Figure 6 of Swanson '355 to provide the a prior art motivation to modify Swanson '501 as would be needed for prima facie obviousness.

While Swanson '355 does suggest using acousto-optic modulators (AOMs) to frequency-shift, the uses and advantages of AOMs as described in Swanson '355 are not relevant to Swanson '501. In particular, Swanson '355 places AOM 320 inside the laser cavity of a ring laser. Swanson '355 uses the AOM 320 to tune the frequency of the laser ring laser. Indeed, frequency-tunable lasers are used in many or all systems of Swanson '355. Nevertheless, such lasers are not relevant to the systems and methods of Swanson '501. In particular, Swanson '501 puts AOMs 38, 40 in an arm of an interferometer rather than in a laser cavity. Furthermore, Swanson '501 does not suggest frequency sweeping with a laser as described by Swanson '355. Instead, frequency shifts in Swanson '501 result from varying properties of arms of his interferometers. Finally, Swanson '501 uses his AOMs 38, 40 in a heterodyne detection scheme to reduce noise rather than to tune a laser frequency or to measure a sample property. See Swanson '501, col. 6. lines 44- 49; col. 9. line 56, to col. 10, lines 10.

Thus, the Office Action has not provided a real motivation for combining

Swanson '355 with Swanson '501 as would be required for prima facie obviousness.

B. Furthermore, the Office Action proposes a modification of the basic principle for the AOMs in Swanson '501. Swanson '501 teaches using Doppler shift modulation to reduce noise. In particular, Swanson states:

[C]orner cube [46] is preferably moved at a uniform, relatively high velocity ..., causing Doppler shift modulation used to perform heterodyne detection.

Col. 6, lines 44 - 49.

Swanson further states:

Where this Doppler shift is less than the required bandwidth to overcome noise, ... , additional modulation is needed to shift the modulation frequency above the predominant noise spectrum.

...

... [T]his supplemental modulation can be achieved by passing light in the reference arm and/or sample arm through acousto-optic modulators (AOM's). ...

Col. 9, lines 56, to col. 10, line 10.

Thus, Swanson's basic principle for having AOMs in the system of Fig. 1A is to provide a modulation that enables overcoming noise. The Office Action proposes modifying this basic principle for the AOM(s) as disclosed in Swanson '501. Instead of using AOM(s) to produce an effect directed at overcoming noise, the Office Action proposes using the AOM(s) and frequency shift induced by the AOM(s) to determine speeds in a sample. This changes the basic principle for the AOMs and associated detector as described by Swanson '501.

It is well-established that modification of a prior art reference that changes the principle of operation of a prior art invention is not of itself sufficient to render a claim prima facie obvious. See M.P.E.P. 21433.02; In re Ratti F.2d 810, 123 USPQ 349 (CCPA 1959). For this independent reason, the modification of Swanson '501 that the Office Action proposes does not make pending claim 1 or claim 15 obvious.

C. Swanson '501 does not suggest measuring motion within a sample. To the contrary, Swanson '501 suggests that sample motion is a potential problem and that measurement effects associated with sample changes should be overcome, i.e., eliminated. For example, Swanson '501 states:

However, for certain applications, for example imaging a dynamical biological sample such as the eye, the scanning speed required to do three-dimensional scanning may be such that a parallel scanning technique may be preferable or may be required.

Swanson '501, col. 2, lines 16 – 21.

Swanson '501 also states:

One potential difficulty with the embodiments of the invention discussed up to this point is that a complete two or three-dimensional scan of a sample may take a substantial period of time. While this may be acceptable for samples which do not change with time, ..., it may not be acceptable for biological samples which may change rapidly in time. FIG. 9 illustrates an alternative embodiment of the invention wherein this problem is overcome by scanning the sample in parallel ...

Swanson '501, col. 15, lines 34-43.

The above suggestion to do parallel scanning, teaches a method for reducing measurable effects of sample changes such as motion therein. Rather than suggesting measuring sample motion, Swanson '501 suggests making apparatus and methods insensitive to effects of such motion. In light of such a teaching, there would have been no motivation to modify Swanson '501 in a way that would explicitly make his apparatus and methods sensitive to such motion. This teaching supports the non-obvious of the modification, which would be needed to arrive at claim 1 or claim 15.

Conclusion

For the above reasons, independent claims 1 and 15 are non-obvious. Dependent claims 3-6 and 16-20 are non-obvious, at least, by their dependence on base claims.

Applicants request allowance of pending claims 1, 3 – 6, and 15 – 20.

In the event of any non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Lucent Technologies Deposit Account No. 12-2325** to correct the error.

Respectfully,



John F. McCabe, Reg. No. 42,854
Telephone: 908-582-6866

Date: July 4, 2004

Lucent Technologies, Inc.

Docket Administrator

101 Crawfords Corner Road (Rm. 3J-219)

Holmdel, New Jersey 07733